
CHAPTER 23

Process-to-Process Delivery:

Solutions to Odd-Numbered Review Questions and Exercises

Review Questions

1. **Reliability** is not of primary importance in applications such as echo, daytime, BOOTP, TFTP and SNMP. In custom software, reliability can be built into the client/server applications to provide a more reliable, low overhead service.
3. **Port addresses** do not need to be universally unique as long as each IP address/port address pair uniquely identify a particular process running on a particular host. A good example would be a network consisting of 50 hosts, each running echo server software. Each server uses the well known port number 7, but the IP address, together with the port number of 7, uniquely identify a particular server program on a particular host. Port addresses are **shorter** than IP addresses because their domain, a single system, is smaller than the domain of IP addresses, all systems on the Internet.
5. The minimum size of a UDP datagram is **8** bytes at the transport layer and **28** bytes at the IP layer. This size datagram would contain no data—only an IP header with no options and a UDP header. The implementation may require padding.
7. The smallest amount of process data that can be encapsulated in a UDP datagram is **0** bytes.
9. See Table 23.1.

Table 23.1 *Answer to the Question 9.*

<i>Fields in UDP</i>	<i>Fields in TCP</i>	<i>Explanation</i>
Source Port Address	Source Port Address	
Destination Port Address	Destination Port Address	
Total Length		There is no need for total length.
Checksum	Checksum	
	Sequence Number	UDP has no flow and error control.
	Acknowledge Number	UDP has no flow and error control.
	Header Length	UDP has no flow and error control.

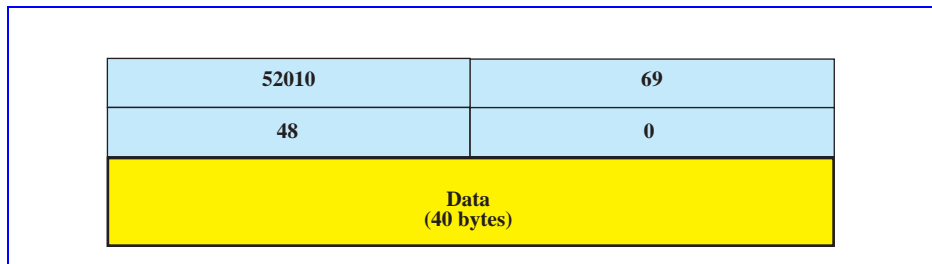
Table 23.1 Answer to the Question 9.

<i>Fields in UDP</i>	<i>Fields in TCP</i>	<i>Explanation</i>
	Reserved	UDP has no flow and error control.
	Control	UDP has no flow and error control.
	Window Size	UDP has no flow and error control.
	Urgent Pointer	UDP cannot handle urgent data.
	Options and Padding	UDP uses no options.

- 11.
- None of the control bits are set. The segment is part of a data transmission without piggybacked acknowledgment.
 - The *FIN* bit is set. This is a FIN segment request to terminate the connection.
 - The *ACK* and the *FIN* bits are set. This is a *FIN+ACK* in response to a received *FIN* segment.

Exercises

13. See Figure 23.1.

Figure 23.1 Solution to Exercise 13

- The server would use the IP address **130.45.12.7**, combined with the well-known port number **69** for its source socket address and the IP address **14.90.90.33**, combined with an ephemeral port number as the destination socket address.
- 16 bytes of data / 24 bytes of total length = **0.666**
- 16 bytes of data / 72 byte minimum frame size = **0.222**
- It looks as if both the destination IP address and the destination port number are corrupted. *TCP calculates the checksum and drops the segment.*
- See Figure 23.2.
- Every second the counter is incremented by $64,000 \times 2 =$ **128,000**. The sequence number field is 32 bits long and can hold only $2^{32}-1$. So it takes $(2^{32}-1)/(128,000)$ seconds or **33,554** seconds.
- See Figure 23.3.
- The largest number in the sequence number field is $2^{32}-1$. If we start at 7000, it takes $[(2^{32}-1)-7000] / 1,000,000 =$ **4295** seconds.

Figure 23.2 Solution to Exercise 23

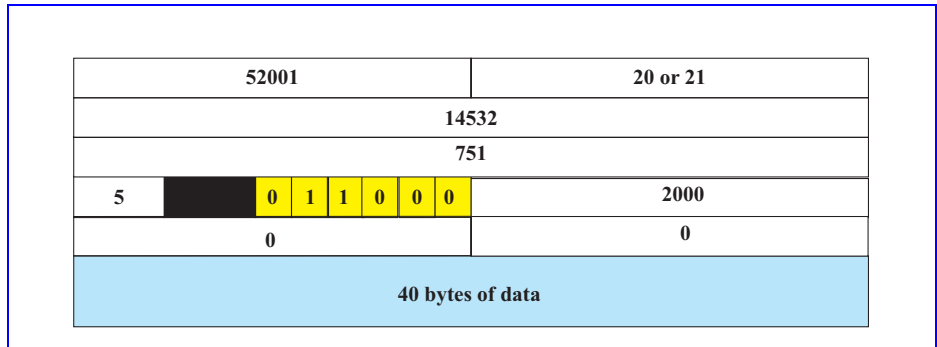
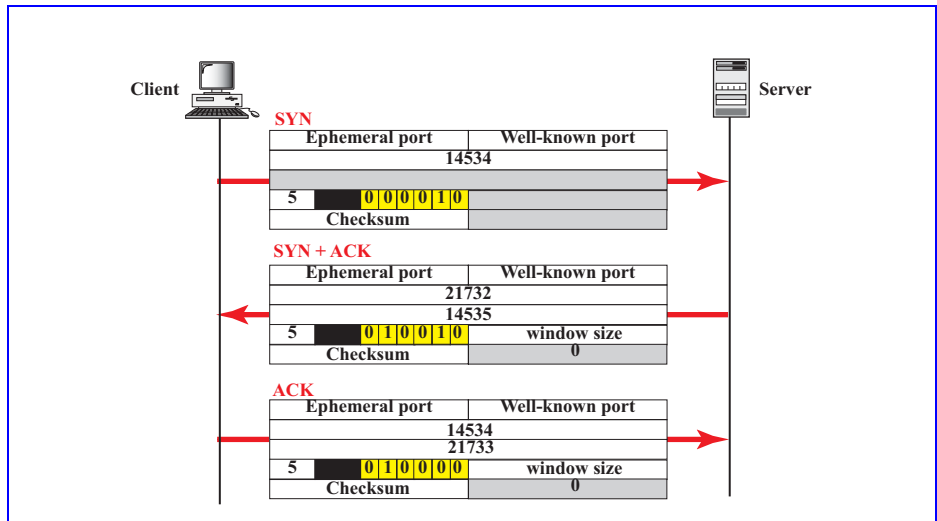


Figure 23.3 Solution to Exercise 27



31. See Figure 23.4.

33. See Figure 23.5.

Note that the value of cumTSN must be updated to 8.

Figure 23.4 *Solution to Exercise 31*

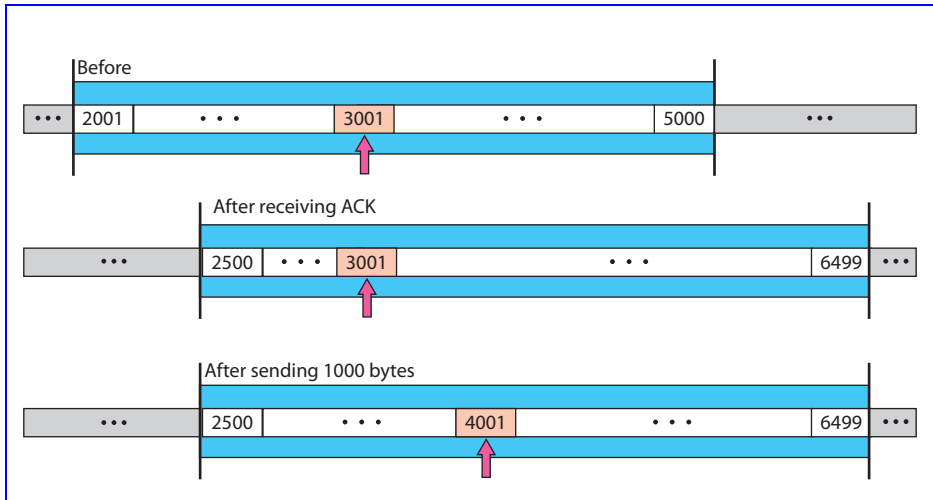


Figure 23.5 *Solution to Exercise 33*

